TAC-TR-62-52

OPERATIONAL TEST AND EVALUATION

A/E 32C-2 AIR CONDITIONER

APRIL 1963

HEADQUARTERS
TACTICAL AIR COMMAND
United States Air Force
Langley Air Force Base, Virginia

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Publications Review

This report has been reviewed and is approved.

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HEADQUARTERS
TACTICAL AIR COMMAND
United States Air Force
Langley Air Force Base, Virginia

FOREWORD

TAC Test Number 62-52, Operational Evaluation of the A/E 32C-2 Air Conditioner, was established in accordance with AFR 80-14 and TACR 80-1. The test was conducted during the period 1 June 1962 through 17 January 1963, by the 727th Aircraft Control and Warning Squadron, Myrtle Beach Air Force Base, South Carolina. The following individuals were responsible for the conduct and management of the test.

TAC Test Supervisor	Maj Erben G. Brown Hq TAC (DORQ-T)
Test Project Officer	2d Lt Donald Mitchell 727th AC&W Squadron
TAC Test Manager	Maj Robert T. Starke Hq TAC (DORQ-T)

ABSTRACT

The AiResearch A/E 32C-2 Air Conditioner is an adequate environmental control unit. It can rapidly attain and maintain a desired temperature level. There are deficiencies in its present design which must be corrected before it will be suitable for use by tactical air weapons control systems Composite Air Strike Force units. The primary deficiencies are the extremely high starting current, difficulty in Freon servicing and the high noise level it generates.

TABLE OF CONTENTS

1. INTRODUCTION. Tactical Air Command has a requirement for lightweight, mobile (transportable) temperature environmental control equipment to control temperatures within Air Weapons Control System (AWCS) mobile shelters. The equipment must be capable of providing cooling and heating to various transportable shelters, i.e., M-1948, S-80, S-82, Quick Erection Domes (QED) and S-205/T inflatable shelters.

2. DESCRIPTION OF THE TEST ITEM.

a. The A/E 32C-2 Air Conditioner provides a supply of either heated, cooled or ambient air. The cooling and heating modes of operation are automatically modulated from hot to cold by the control system which controls the Freon system and the electric heaters. By a manual control, the unit can provide the desired quantity of fresh air for ventilation.

b. The unit is a lightweight, self-contained package using Freon 114 as a refrigerant with one percent concentration of oil to provide lubrication. The basic enclosure, a welded frame, supports the system components and is covered with aluminum sheeting for ducting and skin. Removable panels around the unit provide access for maintenance. Weather protection is provided by a hinged lid on the top of the unit covering the discharge fans and exhaust air relief port, a door covering the condenser air inlet and a shutter assembly on the fresh air inlet port. (See Figure #1.)

c. An electrical control box and a panel of operating and indicating devices are located on one end of the unit. System wiring is distributed in cabling from the control box enclosure to the various components of the air conditioner. All cooling, heating and ventilating system components are located on two isolated decks, along with required ducting for controlling air and Freon flow. (See Figure #2.)

d. Handling of the unit is provided by a combination of handles and lifting points located at each corner of the cabinet. A removable skid base and two towing eyes are provided for ground movement.

e. Operating characteristics of the unit are as follows:

(1) Temperature Control Selection Range - 65° to 85°F.

(2) Power Source - must be 115/220 volts, 400 cycles, 3 phase.

FIGURE #1

A/E 32C-2 Air Conditioner
attached to M-1948 Shelter.

FIGURE #2

1. Handle.
2. Lower deck of unit, showing recirculation fan, Freon receiver, filter rack and heaters.
3. Electrical control box.
4. Control and indicating device panel.

(3) Air Flow - 3500 cubic feet per minute.

(4) Cooling:

(a) Starting amperage - 350 amperes (220 volt input).

(b) Steady state current - 110 amperes (220 volt input).

(c) Capacity - 7.5 tons (90,000 BTU).

(5) Heating:

(a) Steady state current - 69 amperes (220 volt input).

(b) Capacity - 90,000 BTU.

(6) Ventilating:

Steady state current - 14 amperes (220 volt input).

f. Physically, the complete unit consists of five items:

(1) Air Conditioner - 28x56x51 inches.

(2) Cable - 1 each, 30 feet in length, Nr 4 wire, 4-wire cable with cannon plug.

(3) Ducts - 2 each, collapsible, 15 feet in length, 24-inch diameter.

(4) Duct Reducers - 2 each, 24 inches to 16 inches.

(5) Grillwork baffles - 2 each. (See Figure #5.)

3. PURPOSE OF THE TEST. The purpose of the test was to operationally evaluate the effectiveness of the A/E 32C-2 Air Conditioner to satisfy the requirements for reliable air conditioning of AWCS shelters.

4. SCOPE OF THE TEST. The A/E 32C-2 Air Conditioners were operated 1356 hours to monitor the effect of cumulative operating hours on heating, cooling and ventilating reliability and capability. Specific scope items tested were:

a. The ability of the unit's cooling and heating system to maintain temperatures over extended periods, with variations in shelter size containing varying amounts of operating equipments and personnel.

b. Relative heating and cooling rates when coupled to representative shelter environments.

c. The logistic and maintenance support requirements necessary to support the unit in a tactical environment.

5. CONCLUSIONS AND RECOMMENDATIONS.

a. Conclusions.

(1) The AiResearch A/E32C-2 Air Conditioner proved to be an adequate environmental control unit. Results produced during the tests of the cooling, heating and ventilation modes were highly satisfactory. Variation between desired and actual temperatures averaged between one and two degrees Fahrenheit, and time trials demonstrated that the air conditioner rapidly brought the test environment areas to desired temperature levels. In addition, because of its high air-flow rate, the unit was found to be an excellent inflating device for inflating Quick Erection Domes (QED) shelters.

(2) Unit size and weight are suitable for mobility purposes. (See Annex A.)

(3) The unit required only a minimum of maintenance time and logistic support.

(4) Although the unit produced adequate air conditioning, many deficiencies were found during the test. Some of these seriously limit its value and at least the high starting current must be reduced before this unit would be acceptable for tactical air weapons control systems.

b. Recommendations.

(1) That the prohibitively high starting current of 350 amperes be reduced. This could be accomplished by a step-down starter or capacitor arrangement on the compressor, or rearrangement of the temperature controls to allow the compressor to start in a no-load condition.

(2) That the gauge of the power cable wire be increased from Nr 4 wire to Nr 2 wire. Nr 4 wire is too small for the starting surge current of 350 amperes. Nr 2 wire will conform to the National Electric Code standards.

(3) That a viewing hole be cut in the panel covering the Freon sight glass. In order to check the Freon level, the aluminum panel covering the sight glass must be removed. (See Figure #3.) When this panel is off, the air being evacuated from the shelter exits to the atmosphere instead of being blown across the cooling coils. This causes the coils to become cold, which in turn restricts Freon flow, resulting in an inaccurate reading.

(4) That a baffle or sound proofing of top, ends and sides of unit be designed to reduce the noise level generated by the unit. When the unit operates as a cooler, its loudest mode, the following measurements were observed:

(a) Measured outdoors at distance of six feet - 94 decibels.

(b) Measured outdoors at distance of ten feet - 85 decibels.

AFR 160-3, 29 October 1956, requires earplugs at 90 decibels and recommends them at 85 decibels.

(5) That a small hand-transportable Freon-oil mixing and servicing unit (with small wheels for easy personnel towing) be designed for use with deploying A/E 32C-2's.

(6) That the duct length be increased to 30 feet. This could be accomplished by providing two additional 15 foot lengths. The present length of 15 feet requires that the air conditioner be placed approximately six feet from the shelter, which allows unit noise to penetrate into the shelter. Also, short ducts prevent duct-shelter entry ports from being spaced far enough apart for optimum air circulation.

(7) That the air relief exhaust port be provided with an adjustable spring mechanism to permit manual selection of the bleed-off pressure or other changes be made to permit air conditioning of inflatable, pressurized shelters. The air relief exit port is presently designed so that when the unit's hinged top lid is open, any air pressure within the shelter that exceeds atmospheric pressure will bleed off into the atmosphere. The port consists of a vertical shaft, with one end open to the shelter interior and the exit end covered by a lightweight aluminum door, 12x12 inches, which raises when subjected to pressure from below.

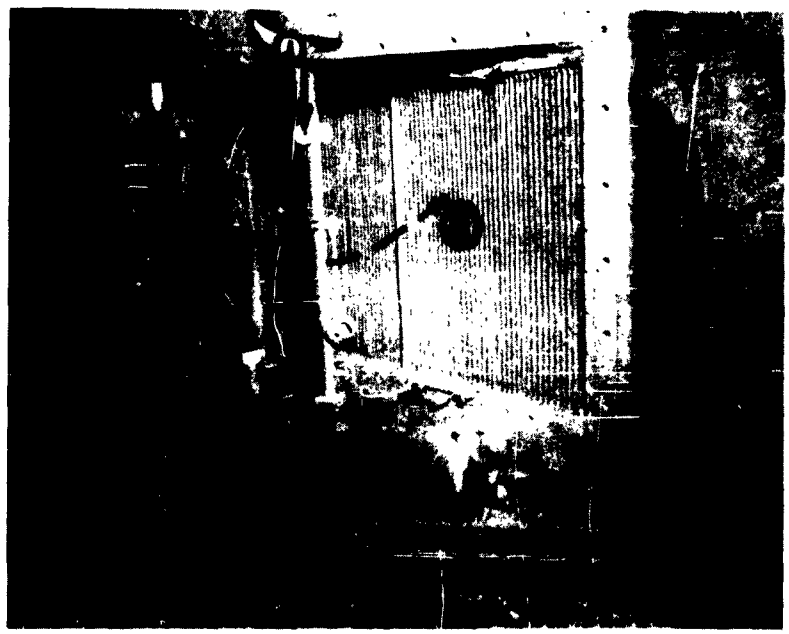


FIGURE #3

1. Freon sight glass.
2. Path that air flow should follow.
3. Air flow when the panel is removed.

This feature makes the unit useless for air conditioning inflated, pressurized shelters such as the AN/TPS-27 Radome.

(8) That a design change be made to prevent water leaking into the unit interior through the exhaust fans when the unit is operating in the automatic mode. (See Figure #4.) The hinged top lid must be open when the unit is cooling. Precipitation enters the unit's upper deck between the fan blades when the top cover is open and the fans are stopped. The fans run continually in the cooling mode and are off in the heating mode. When the unit operates in the automatic mode, it oscillates from cooling to heating. Leakage then occurs into the upper deck, which contains non-weatherproof wiring. One method to solve this problem would be the use of removable sheet metal "goose neck" vents which could be attached to the fan discharges.

(9) That green covered wire be used as ground in the power cable. The present black ground wire violates National Electric Code standards.

(10) That the hole in the drain pan be enlarged. The present hole, 1/8 inch in diameter, tends to clog when the unit is operated in dusty conditions.

(11) That the baffles be redesigned so that all shutters can be simultaneously adjusted by one handle, and that all shutters be adjustable directionally, i.e., to either side, up or down. The possibility of replacing the present baffles, which are large and bulky, with lightweight aluminum circular shutter assemblies to fit directly over the duct reducers should also be investigated. The present baffles are heavy and each shutter must be individually adjusted. (See Figure #5.)

(12) That the manufacturer's handbook be corrected to provide maintenance information consistent with Air Force standards. The present section dealing with trouble shooting does not permit efficient analysis of component failures.

(13) That a 400 ampere ammeter be installed on the unit. The present ammeter reads to a maximum of 300 amperes, while the unit draws 350 amperes when the compressor is starting. This requirement will cease to exist with the modification correcting heavy starting loads.

(14) That an hourmeter be installed on the recirculation fan. This will provide a record of heating and ventilation hours, in addition to the cooling hours presently recorded on the compressor hourmeter.

FIGURE #4

1. Hinged top lid, shown closed.
2. Exhaust air fans.

FIGURE #5

Grillwork baffles installed in M-1948 Shelter.

1. Conditioned air duct (cold or hot).
2. Return air duct.

(15) That Freon 114, the required refrigerant, be procured in 30-pound bottles for both routine maintenance and mobility purposes. Freon 114 is not presently available in the federal inventory.

(16) That additional handles be installed on the unit's sides to facilitate manual ground handling and to comply with ground safety standards on the maximum weight that one person can safely lift, i.e., 75 pounds.

(17) That lightweight metal containers be provided with the unit to contain spare parts and accessories for deployments.

6. TEST RESULTS AND DISCUSSION.

a. Test Duration. The A/E 32C-2 Air Conditioner was tested at Myrtle Beach Air Force Base, South Carolina, from 1 June 1962 to 17 January 1963. The two air conditioners used during the test period operated a total of 1355 hours. The units were utilized for the following purposes:

(1) Cooling - 1137 hours.

(2) Heating - 173 hours.

(3) Ventilating - 45 hours.

b. Test Environments.

(1) Radio Maintenance Shelter (See Chart 1, Annex B):

(a) One air conditioner was operated on this shelter in the cooling mode. The shelter consists of two connected M-1948 Shelters. These shelters are semi-circular in profile and constructed of wooden frames covered with heavy duty canvas blankets, insulated with fiberglas. To achieve the best cooling effects, the conditioned air duct was placed on the larger shelter portion, with the exhaust duct on the smaller portion.

(b) The shelter was occupied by an average of ten maintenance personnel and four operating pieces of electronic test equipment.

(2) S-205/T Electrical Equipment Shelter (See Chart 2, Annex B):

(a) One air conditioner was used on this shelter in the cooling mode, in conjunction with the AN/UPS-1 Radar test project.

The shelter is made of a double wall of heavily rubberized ducting which is inflated to hold the shelter erect. Once inflated, the shelter remains so for extended periods of time. The inside walls of the shelter were lined with a RF shielding, providing additional insulation.

(b) The shelter housed ten assorted items of operating electronic equipment and an average of ten operations and maintenance personnel.

(3) Radar Operations Office (See Chart 3, Annex B):

(a) One air conditioner was used on this room in the cooling mode. The room is part of a permanent building. The room occupies the corner of the building, with walls of plasterboard and wood shingling. A door to the room that was open for personnel traffic most of the day slightly affected the test data.

(b) During the test, the office housed an average of ten clerical and administrative personnel with office furniture and equipment.

(4) Maintenance Control Office (See Chart 4, Annex B):

(a) One air conditioner was used on this shelter in the heating and ventilating modes. The office consisted of connected M-1948 Shelters making up a total length of 100 feet. (See Figure #1.)

(b) During the test, the shelter housed an average of fifteen personnel with office equipment.

c. Test Results.

(1) Cooling Mode:

The test units were used for cooling in three of the four test environments. The results of these tests are presented graphically in Charts 1, 2 and 3 of Annex B. On each chart, average actual indoor temperature is plotted with the desired control temperature to which the unit was set. The maximum deviation between these temperatures in any environment was 5° F, and the average deviations ran from 1.2 to 2.5° F. On each chart, average ambient temperature is also plotted.

Environment	(Chart 1) Radio Maintenance Shelter	(Chart 2) S-205/T Shelter	(Chart 3) Radar Operations Office
Days of test duration	34	28	11
Average number of hours per day of testing	9.6	9.7	8.5
Maximum deviation between desired and actual temperature	4°F	4°F	5°F
Average deviation between desired and actual temperature	1.1°F	*1.2°F	**2.5°F

* Only in this case did the actual temperature run consistently lower than the desired temperature. This was due to the combination of the S-205/T Shelter's small area and the large capacity of air conditioner (7.5 tons). The fact that the unit could stay as close as it did to desired temperatures demonstrated a satisfactorily sensitive control system.

** In this case, a door to the Radar Operations Room was open for personnel traffic during most of the duty day. This caused a leakage of cool air and biased data.

Environment	Radio Maintenance Shelter		S-205/T Shelter		Radar Ops Office
	1st Test	2d Test	1st Test	2d Test	
Ambient temperature	90°F	84°F	89°F	94°F	82°F
Shelter temperature at start of test	90°F	84°F	89°F	94°F	82°F
Desired control temperature	71°F	65°F	73°F	73°F	69°F
Lowest temperature reached	72°F	66°F	72°F	73°F	70°F
Time required to reach lowest temperature (min)	38	32	17	21	22
Average number of personnel present	6	6	6	8	8
Average number of operating electronic equip.	2	4	4	5	N/A

(2) Heating Mode:

One test unit was used for heating on the Maintenance Control Office, as shown in Chart 4 of Annex B. The maximum deviation between the desired control temperature and the actual temperature was three degrees, while the average deviation was 1.7°F.

Environment	(Chart 4) Maintenance Control Office
Days of test duration	15
Average number of hours per day of testing	9.8
Maximum deviation between desired and actual temperature	3°F
Average deviation between desired and actual temperature	1.7°F

(3) Results of Time Trials:

Environment	Maintenance Control Office	
	1st Test	2d Test
Ambient temperature	36°F	42°F
Shelter temperature at start of test	37°F	42°F
Desired control temperature	75°F	75°F
Highest temperature reached	74°F	75°F
Time required to reach highest temperature (min)	42	31
Average number of personnel present	12	15

(4) Ventilating Mode: Very satisfactory. One unit was operated on the Maintenance Control Office as a ventilator for 25 hours. The ratio of fresh air to recirculated air was varied from zero to one. The unit responded accurately to variations in the fresh air damper control.

(5) Shelter Inflation Trial: Very satisfactory. On three occasions, the A/E 32C-2 Air Conditioner was used to inflate Quick Erection Dome (QED) Shelters, which are 48 feet in diameter. These shelters, when inflated, form approximate hemispheres. The shelter skin is a double layer of treated fabric. Complete inflation each time required between 14 and 17 minutes.

d. Discussion.

(1) Cooling Mode:

The units tested performed very satisfactorily in both the operational and time trial tests. Ambient temperature variations did not appear to affect the unit's ability to achieve and retain selected indoor temperatures. Areas tested were brought to desired temperatures within 30 minutes after the unit was turned on.

(2) Heating Mode:

Heating operational performance was highly satisfactory. The unit was considerably slower in achieving desired temperature levels in the heating mode than in the cooling mode. Partial explanation lies in the fact that the Maintenance Control Shelter (heating test environment) was the largest test area used. However, the demonstrated time of 35 minutes is considered satisfactory.

(3) Ventilating Mode:

(a) The unit's ability to provide controlled ventilation was satisfactorily demonstrated.

(b) The tests in which the unit was used as an inflating device proved that the unit's high rate of air flow (3500 CFM) can be used for additional functions.

7. INSTALLATION OF THE TEST ITEM.

a. Installation and removal procedures for the air conditioner are simple. The lightweight unit is easily maneuverable by forklift or by hand, if necessary.

b. Several problems were encountered with connecting the unit's ducts to test shelters. This was considered primarily a defect of the shelters. In the case of the M-1948 Shelters, there were no provisions for accommodating air conditioner ducts. Adequate, but unsatisfactory, arrangements were devised by putting the ducts into the shelters at floor level and folding the shelter blankets around them. In the case of the S-205/T Shelter, the only available access ports were so low to the ground and so small (12" diameter) that trenches had to be dug for the ducts.

8. MAINTENANCE RESULTS. The following maintenance actions were taken on the two units operated during the test period.

a. After the A/E 32C-2's came out of temporary storage (March 1962), Freon servicing was required. Due to the non-availability of Freon-oil mixing equipment, the air conditioners were shipped to the Atlanta Airport where large, heavy servicing equipment was available. Units were serviced, returned and testing continued.

b. Routine maintenance: Periodic inspections as suggested in the manufacturer's handbook (Report Nr 6-183) required one hour at 100 operating hour intervals.

c. Maintenance actions on the first unit:

(1) At 400 hours of operation, the cannon plug connecting the cable to the unit shorted out. Two hours were required to replace the plug.

(2) At 405 hours of operation, the unit began spraying water into the shelter to which it was attached. Four hours were required to empty, clean and enlarge the hole in the unit's drain pan.

(3) At 580 hours of operation, the unit's compressors failed to respond to controls. Maintenance was delayed for seven days, at which time the unit was found to be operational. Two hours were spent in inconclusive trouble shooting.

(4) At 580 hours of operation, one indicator bulb was replaced on the unit, requiring 25 minutes.

d. Maintenance actions on the second unit:

At 530 hours of operation, the cannon plug connecting the unit to its cable shorted out. Two hours were required to replace the plug.

9. LOGISTIC REQUIREMENTS.

a. Because of the few instances of unit failure due to defective components, the test period did not generate sufficient data to establish a normal stock level of parts.

b. The following estimate is based on brief experience with the unit, the previous experience of maintenance personnel and a study of the manufacturer's handbook.

c. Estimated requirements for a 30-day stock level adequate for one air conditioner are:

Part Number	Nomenclature	Quantity Required
12895	Transformer (72964)	1
MS 25002-3	Selector	1
512282	Resistor, Variable	1
2220	Knob (83330)	2
MS 25089-3CR	Switch	1
AN 3021-10	Switch	1
3AG5A-SB	Fuse	1
39-28-971	Lamp (72619)	1
39-28-972	Lamp (72619)	1
Comml	Lubricating Oil, 1 qt can	2
Comml	Freon 114, drum, 30 lb	1
HR 10211	Diode (73293)	3
B32513	Drier (41947)	1
173086	Screen, Protective, Round	1
170704	Washer, Safety Head, Freon Condensor	1
Comml	Disc, Rupture, Aluminum, 1/2" diam., 176-203 PSIG, 72°F, 22.2°C (07477) (70210) Spec Nr PS 170796	2
Comml	Disc, Support Rupture, 77-28-1, Type A (07477) (70210) Spec Nr PS 170796	2
547606	Control, Temperature (Model Nr AMTC 1-55)	1
D24460	Controller (8-2227)	1
547604	Transformer, Current (Model Nr TCCL-1)	1
B 138F	Contractor (74063)	3
S-15206	Protector, Motor	1
B-113	Contactor (74063)	1

d. Without a mobile refrigerant service unit, servicing the unit properly is impossible. This unit mixes the proper ratio of Freon 114 and lubricating oil and contains the necessary equipment for servicing the unit's Freon system.

10. DEFICIENCIES. Seventeen deficiencies were found during the test period.

a. The starting surge current is too high (350 amps).

b. The Nr 4 wire in the power cable is too small to safely carry the load that the unit draws when operating in the cooling mode.

c. One of the access panels must be removed to view the Freon sight glass. Removal of the panel allows air escape, which in turn causes an inaccurate reading in the sight glass.

d. The noise level generated by the unit is too high.

e. No refrigerant-oil mixing and air conditioner servicing equipments were available.

f. The ducts provided with the unit are too short.

g. The relief air exhaust port prevents the unit from being used on inflated, pressurized shelters.

h. With the unit's top hinged lid open, rain enters the interior of the unit between the blades of the exposed exhaust air fans.

i. The power cable has an improperly colored ground wire.

j. The hole in the unit's drain pan is too small for proper drainage.

k. The shutters of the grillwork baffles which attach to the end of the ducts are awkward to install and troublesome to adjust direction of air flow.

l. The manufacturer's handbook does not provide adequate information.

m. The ammeter on the unit has a maximum reading of 300 amps, while the unit draws 350 amps when starting the compressor.

n. The unit hourmeter logs only compressor time, which means that no mechanical record is kept of heating and ventilating hours.

o. Freon 114, the required refrigerant, is not presently in the federal inventory.

p. Present number of handles does not allow sufficient personnel to assist in ground handling of a unit of this weight.

q. No spare parts and accessories containers are provided.

11. TRAINING REQUIREMENTS. Due to the unit's relative uniqueness, special training for maintenance personnel is deemed necessary. In support of this test, one refrigeration specialist, AFSC 54450W, was given 24 classroom hours and 16 hours of on-the-job training at the manufacturer's plant. This training or its equivalent is considered sufficient.

12. PERSONNEL REQUIREMENTS. From the small amount of maintenance data generated during the test, it is estimated that one repairman could adequately maintain up to 50 A/E 32C-2 units.

DISTRIBUTION LIST

HQ USAF	
AFORQ-TF	2
AFXOP-TA	2
AFSME	2
AFSSS	2
USAFE	
OTS-R	2
PACAF	
PFORQ	2
AFSC	2
AFLC	
MCFLC	2
ASD	
TACSO-A	2
ASNNSA	2
ESD	
TACSO-E	2
ESSK	2
APGC	
TACLO-P	1
USAF SAWC	2
USAF TARC	
TACT	1
ROAMA	
RONEW	2
RONUP	2
RONUSA-2	1
RONUSB	1
RONCA-2	1
ASTIA	
TIS	1
AU	
AUL3T	2
AGOS	
N-8	2
9 AF	
DOC-E	1
12 AF	
DOOP-S	1
19 AF	
DO	1
727 ACWRON	2
412L JTS	
TACR	2
507 Comm Con Gp	
DO-412L	2
Hq TAC	
DMEM	1
DMS	1
DCE	1
DPL	1
SEG	1
LN	2
LM	2
LAR	2
OA	1
OS	1
DOPL	1
DORQ	10
	2

ANNEX A

Specifications for an A/E 32C-2

Air Conditioner Mobility Package

ANNEX A

Specifications for an A/E 32C-2 Air Conditioner Mobility Package

Item	Weight (pounds)	Cube
A/E 32C-2 Air Conditioner, 1 each	550	46.3 cu. ft.
Metal Box, containing: Power Cable, 30 feet in length Ducts, 2 each, 24-inch diameter, 30 ft Duct Reducers, 2 each	50	14 cu. ft.
Grillwork Baffles, 2 each, banded together	40	18 cu. ft.
Metal Box, containing: Spare parts Freon 114 bottle, 30 lbs	80	10 cu. ft.
Mobile Servicing Cart	Unknown	Unknown
Total (minus cart)	720 lbs	88.3 cu. ft.

ANNEX B

Combined Environment Diagrams

and

Operational Test Result Charts

ANNEX B

Combined Environment Diagrams
and
Operational Test Result Charts

1. The schematic on each chart is a scaled drawing of the test environment for which data results are graphically displayed on the lower part of the same chart. Environment (shelter) dimensions are also given.

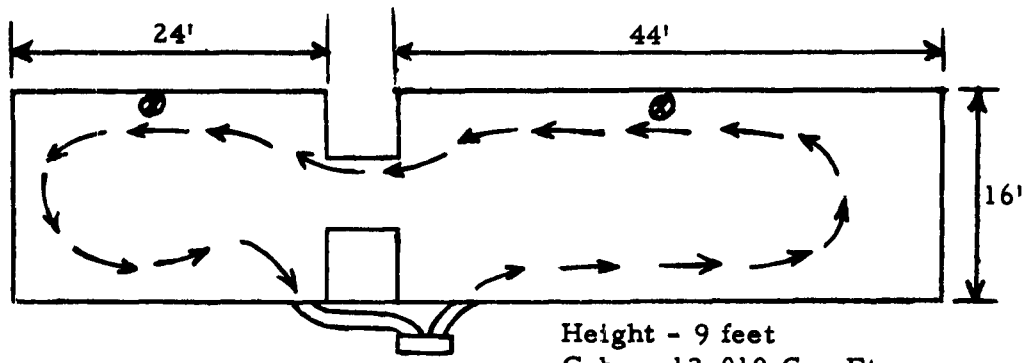
2. Arrows within the diagrams indicate approximate airflow pattern. The circled X indicates the position of thermometers from which data readings were taken.

3. Cooling mode data results are reflected on Charts 1, 2 and 3. Heading mode data results are reflected in Chart 4.

4. On each chart, temperatures are read from the vertical in ^{o}F, while days of unit operation is read from the horizontal.

Legend:

————————	Average of temperature achieved.
.....	A/E 32C-2 temperature control setting.
- - - - - - - - - -	Average outdoor ambient temperature on days of testing.



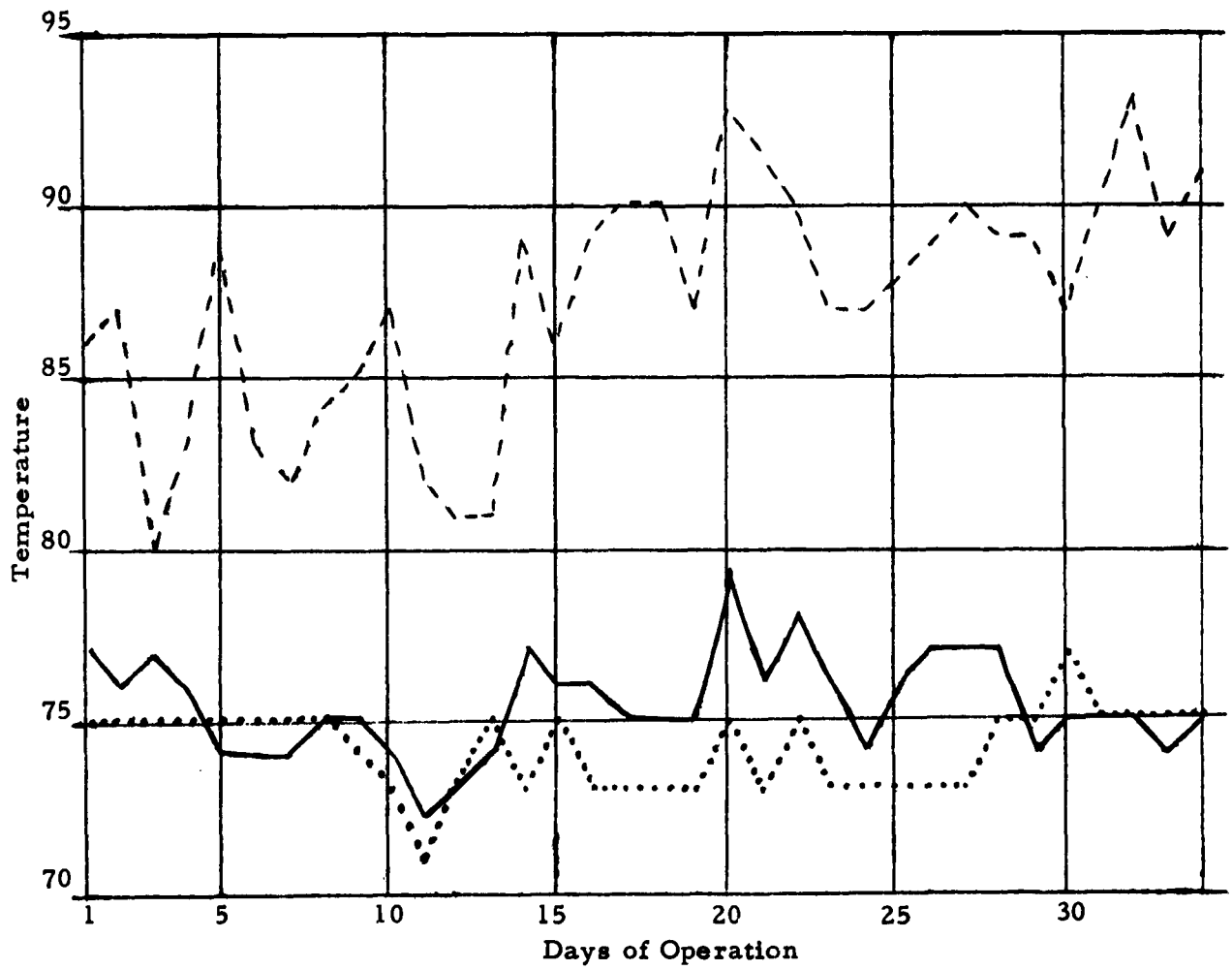
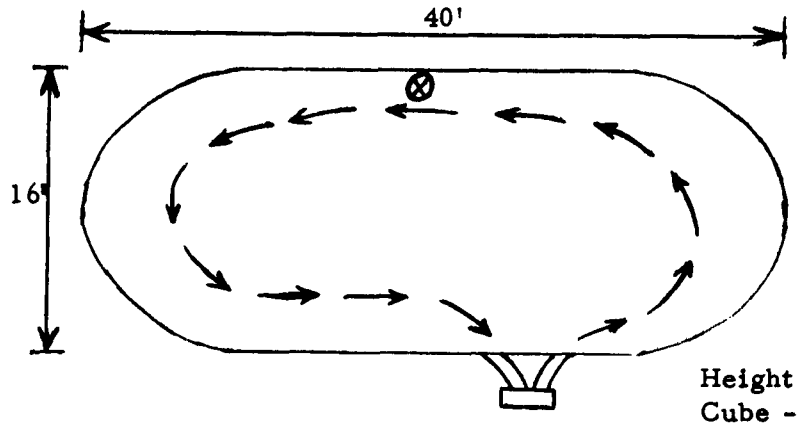


Chart 1

Radio Maintenance Shelter (M-1948 Shelter)
(Cooling Mode)



Height - 8 feet
Cube - 2736 cu. ft.

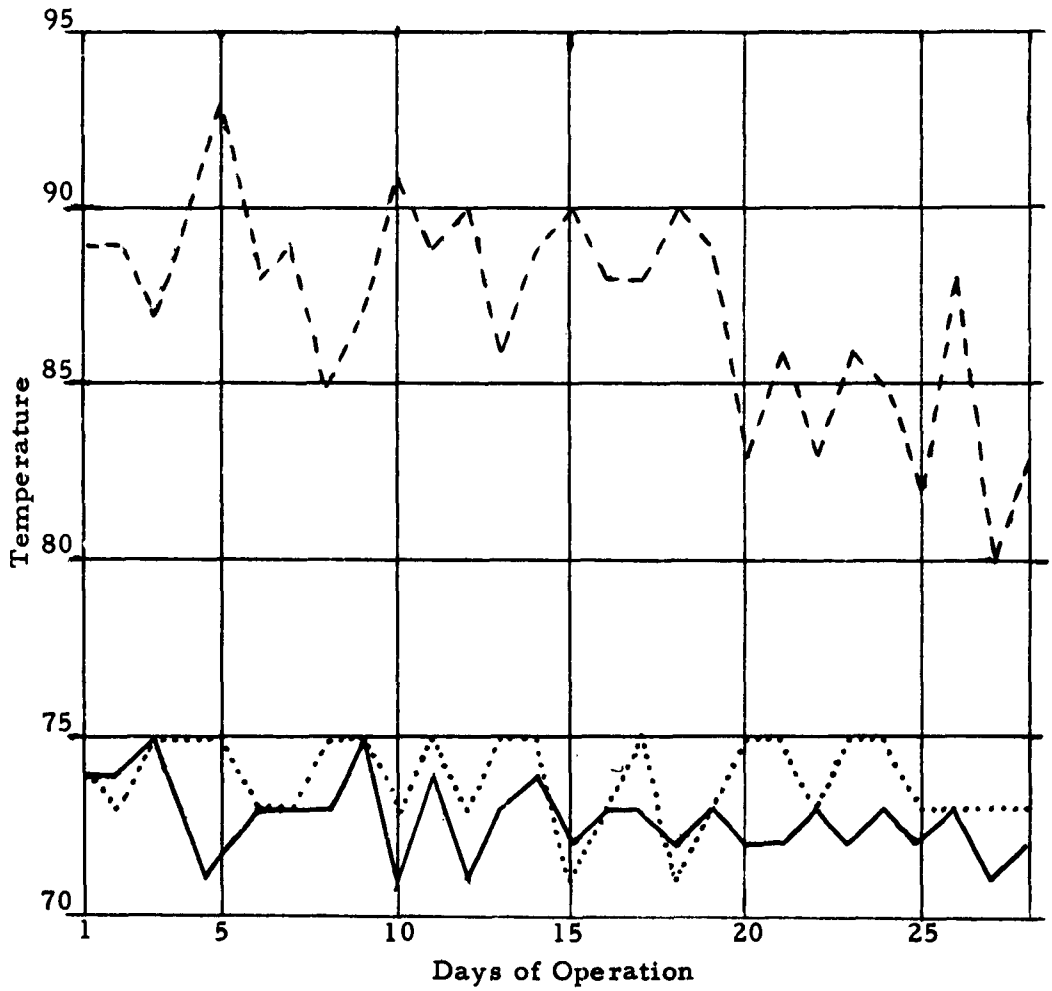
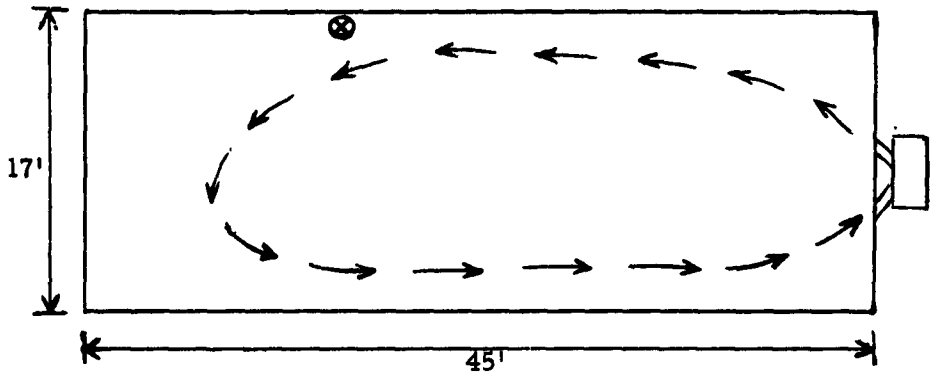


Chart 2
S-205/T Electrical Equipment Shelter
(Cooling Mode)



Height - 8 feet
Cube - 5680 cu. ft.

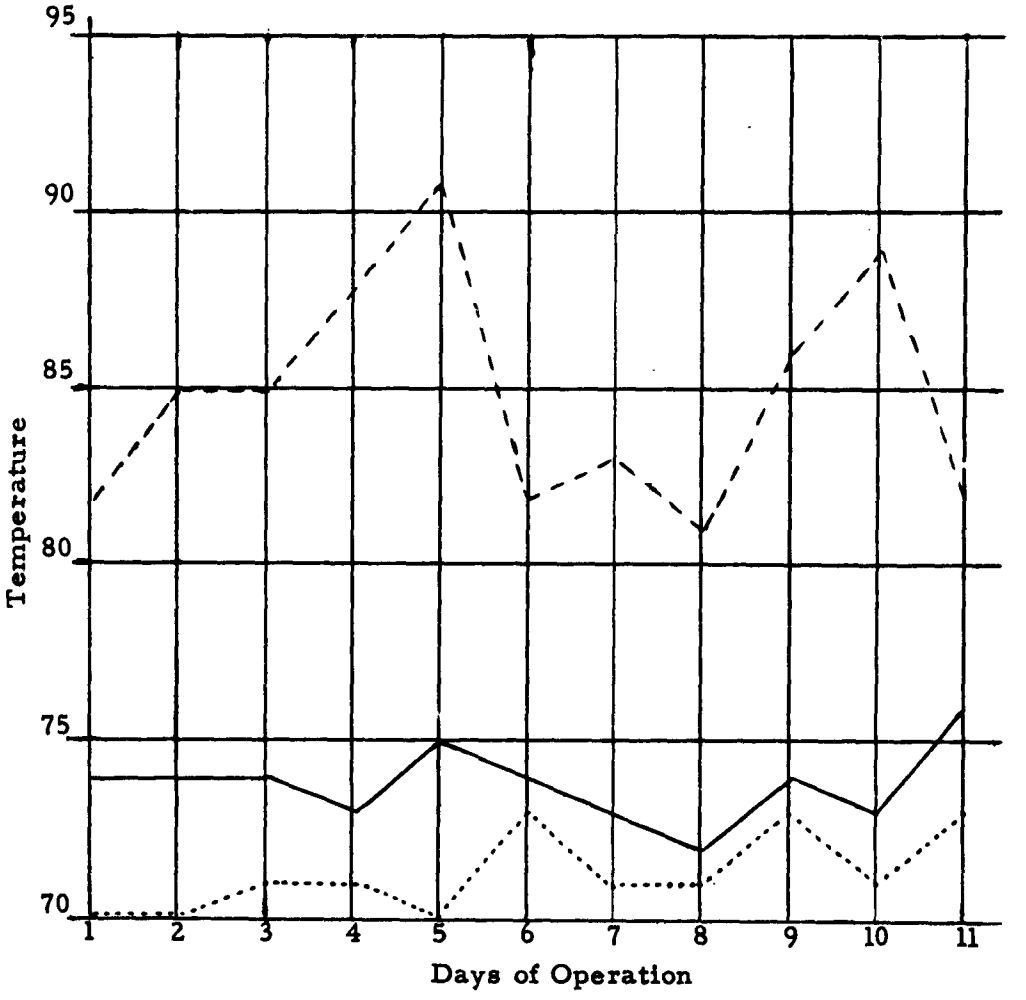
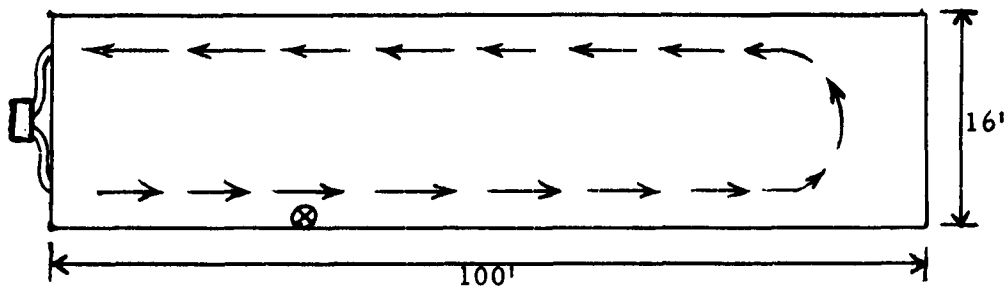


Chart 3

Radar Operations Office
(Cooling Mode)



Height - 8 feet
Cube - 15,700 cu. ft.

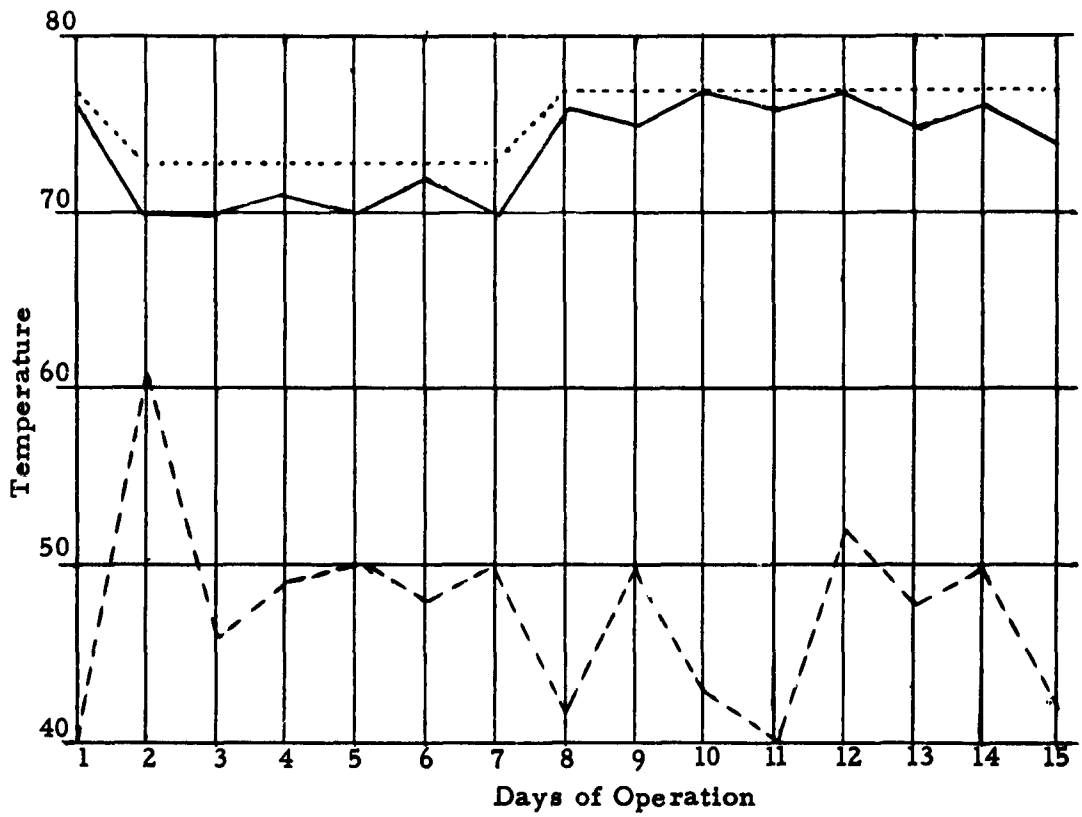


Chart 4
Maintenance Control Office (M-1948 Shelter)
(Heating Mode)